

The HARPSICHORD



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HARPSICHORD

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A change of address card must be on file at *The Harpsichord* office in order to receive missed issues, due to address change, without cost.

THE COVER

The beautiful H. A. Hass harpsichord which appears on the cover was built in 1732. A complete article on the instrument, written by harpsichord instructor Nanette G. Ludge, begins on page 10.

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ACKNOWLEDGEMENTS

The International Society of Harpsichord Builders is proud to give special recognition to the following Contributing Members whose interest and generosity aid materially in the development and preservation of the instruments and music of the baroque period and assists in furthering the various projects and programs of the Society.

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GO FOR BAROQUE

by *Hal Haney*



Just a few minutes ago, I said goodbye to three of the most charming people I have met in some time. For two of them, it was their first trip to America and they were en-

joying every minute of it. I am speaking of Dr. and Mrs. Hanns Neupert from Germany. Dr. Neupert is President of the harpsichord company which bears his name. The meeting was arranged by Ted Mix of Magnamusic who accompanied the Neuperts to Denver. The visit resulted in obtaining some very interesting information about the Neupert shops and Dr. Neuperts philosophy of building, all of which will appear in a future issue.

A number of members have been having difficulty obtaining Hugh Boyle's book "Intervals, Scales and Temperaments". I have just heard from Hugh who informs me that it is now available for purchase from Purnell Library, Inc., 850 7th Avenue, New York, N. Y. 10019. This 246 page volume covers the subject in an interesting and comprehensive manner.

Now another bit of good news. We have a new supply of the popular Harpsichord binders. The price is \$6.00 each and includes the Readers Guide and shipping. Each binder protects 12 issues. One member even called them sexy! They make wonderful gifts.

In the last "Harpsichord of Note" feature, written by Bjarne Dahl (Vol. IV, No. 3) I took the liberty of adding some of my own opinions to the photographic captions indicating

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the possibility that the instrument featured may originally have been a clavicytherium. Bjarne wrote in response to my conjecture and part of his letter follows:

"There is, of course, a valid theory on this instrument that it just might be a converted Clavicytherium. The earliest known Clavicytherium dates from 1572 and this instrument is in the Belle-Skinner Collection at Yale. However, the vertical harpsichord is recorded in 1620 by Rigoli of Florence and even more important, recorded by Mersenne in 1636. The Clavicytherium is quoted by Virdung as being newly invented in his publication of 1511. One can only conclude that the Clavicytherium is old and is an upright harpsichord that is early 16th century in origin.

"Concerning the Skokloster instrument mentioned in my last article: It is entirely within the realm of possibility that it is a mid 17th century conversion of a clavicytherium on the basis of the art work on the lid and the frontal bracing. These instruments were generally either single strung or double strung in the 8' range. I can only guess at present that the possibility of this conversion from a double 8' to a double 8' and 4' specification and possible extension of the scale and keyboard range on the basis of the strapwork and Gesso artwork plus or minus alterations of small order, took place very early.

"The only proof concerning this matter, if it can be determined at all, will come from the age and the style of gold lettering. I have been told that a lettering expert who knows antique lettering styles and forms would be the only hope in determining an approximate period of age. This authority would have to be an expert in Latin as well as with lettering. I have written to authorities in England and Germany and so far my efforts have been to no avail. My conclusions are based upon the family records as presented to me by Frederik Von Essen who has all the family records and ledgers concerning this estate. As nothing was added to this castle since 1675 and nothing altered to distort

any of the antiques or treasures, this instrument, in my opinion, presents a very interesting question. My conclusions, which follow, are of course open to correction: The instrument is an early 17th Century Harpsichord possibly converted from a Clavicytherium in the 17th century with specifications far ahead of any surviving antique instruments presently on record. I stand to be corrected if anything otherwise can be proven. Further research will determine whether or not I am correct. The problem is most fascinating at any rate."

Bjarne B. Dahl
Sunnyvale, Calif.

If anyone can add anything to Bjarne's conclusions we would be happy to publish them.

We have several new advertisers in this issue which we very much appreciate. Huegel of Paris announces an excellent selection of music in a big ½ page on the back cover. Huegel has been known as one of the leading music publishers for many years. Now it is possible to buy directly from them. As in the case when responding to any of our advertisers, it is appreciated by them (and us) when you mention "The Harpsichord."

About 90% of our memberships expire with this issue of the magazine and I do hope you will want to renew. We are still struggling along and the loss of even one member is keenly felt. It is not financially possible to send out individual statements to everyone, but if there is a pink notice and a return envelope in this issue, I do sincerely hope you will write a check for your dues (still \$8 and \$9) and send it to us today if possible.

Our next issue features a day-long visit to the shop and home of harpsichord builder Frank Hubbard. He discusses an incredible variety of subjects most related to early music and instruments. He tells us how he selects apprentices and what he requires of them. His method of selection is probably like no other harpsichord maker in the world. He also speaks honestly about his desires for the future and reveals some talents

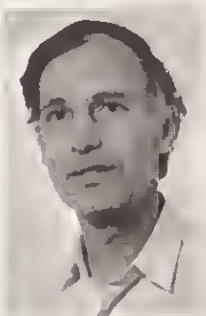
(Continued on page 17)

SYMPATHETIC VIBRATIONS

Clavicimbel Week in Bruges

by Wallace Zuckermann

Bruges is a town in Belgium whose medieval character is so well preserved that open sewage is dumped into its many canals to give sanitation the authentic flavour (and odour) of the



period. Every three years an international harpsichord competition and exhibition takes place at the Concertgebouw, in which contestants from all over the world compete for five prizes and harpsichord makers compete with each other and their customers to be heard above the general din.

The exhibition takes place on two floors of the huge Concertgebouw building, and this space contained some six dozen instruments, arranged helter-skelter, without partitions or soundproofing of any kind. In this sort of arrangement, only the loudest, biggest, and most fancy decorated instrument stands even half a chance of attracting the attention of the aimlessly wandering public.

Some thirty aspiring harpsichordists competed for the prizes, the first of which was 40,000 Belgian Francs (about \$1,000). The aspirants played in a large auditorium filled with people who got tired of wandering among the instruments, and in front of a jury consisting of Isolde Ahlgrim (Vienna), Kenneth Gilbert (Montreal), Charles Kocning (Brussels), Gustav Leonhardt (Amsterdam), Raymond Schroyens (Brussels), Colin Tilney (London), and Robert Veyron-Lacroix (Paris). One would think that such a distinguished jury would fairly and impartially select the best qualified players, and perhaps that is what did happen. However rumor has it that the jury could not agree at all, and was, in fact, threatened by a walk-out of some of

its members. This happened because each juror wanted the awards to go to his own students. Admittedly, they had little to choose from. The few contestants I heard, before going to sleep, were so far away from playing music that I could barely identify the composer. I was told that this is because the harpsichord is not considered a musical instrument but a sewing machine. Be that as it may, the first prize was won by a young man who possesses neither a teacher nor an instrument and gets his instruction from listening to records. He is an American named Scott Ross, who wore a flamboyant pair of trousers, T-shirt, and denim jacket for his audition. I thought he played very well indeed.

Among the makers exhibiting were Bedard (represented by Philippe Heugel, who is marketing Bedard's kit-designs), Feldberg, Goble, Beckerleg, Ammer, Lindholm, Wittmayer, Jiskoot, Kaufmann, Klop, Maenc, Merzdorf, Sassmann, Schuler, Schutze, Sperrhake, Rubio, Michael Thomas, and yours truly. I went around trying to play the various instruments, but found it pretty hopeless to hear anything. The instrument causing the greatest stir was the one contributed by David J. Rubio. Rubio is a guitar and lute maker who was born in England but who worked for many years in New York. He has recently returned to England and set up his workshop near Oxford. He was astute enough to hire a number of good workmen, all of whom had worked for other harpsichord makers before. One of them, Andrew Douglas, had worked originally for old Arnold Dolmetsch himself, and later for a long time for the Gobles. Unlike the Gobles who put Andrew Douglas on voicing year in and year out, Rubio allowed Douglas a great deal of freedom and initiative, and as a result the instrument in the show was probably more Douglas' work than Rubio's, who is now transferring some of his interest to Gambas.

The instrument was handsomely decorated with black and gold exterior and blue interior. One of the rea-

sons it was so popular at the show was that it made more noise than any other instrument there, and thus could be heard above the general din. I found the individual stops very pleasant, but noticed that the ensemble of two 8' and 4' came out somewhat strident. This could not have been the fault of over-voicing since Andrew Douglas is a top expert voicer. It may have been strung too heavily. Although I left before the finals, which were played on the Rubio, some of the listeners at that performance reported that the instrument left much to be desired. At any rate, Rubio said that Leonhardt and Kenneth Gilbert ordered instruments from him.

I don't think many of the other makers received orders. The crowd seemed to be interested in the biggest instrument with the most stops. Without actually having enough money to pay for even a spinet. I found the Feldberg copy of Goujon to be a very good instrument. This was made by their chief workman named Whale. A harpsichord maker is thus often only as good as his best workman. There were many other historical copies there; and if this show differed from previous shows, it was largely in the great number of copies and correct looking instruments. In fact, except for a few die-hards like Lindholm and Sperrhake, almost every maker contributed at least one reasonable looking instrument. Wittmayer had several, among them an Italian copy, which I was curious to play since I myself contributed an Italian copy (in kit form). However, I had hardly touched the keys when Wittmayer himself dashed out of a corner and stopped me, saying that the instrument was sold and thus couldn't be played. One wonders if the new owner will be permitted to play it!

I also liked the contributions by Goble, Jiskoot, Klop, and Beckerleg. But I probably missed many, and couldn't hear others. Michael Thomas and I together showed a double-manual based on the classical French harpsichord, which Michael Thomas designed and to which I contributed the action. This will be a kit, and it

was liked by Leonhardt who played it for a while. Since we finished the instrument on the last day, it was minus lid, proper legs, or the right finish; and standing in a corner, it did not attract a great deal of attention. A copy of a classical clavichord (C. G. Hubert) which we also contributed (and which will also be a kit) was, of course, inaudible above the general noise level.

All in all, one came away from the exhibition liking the harpsichord less than one had previously. I find trade shows an especial bore anyway, and it seems that the harpsichord is curiously resistant to being merchandised like refrigerators or sports cars. Rather than the public being the gainer in a show like that, the harpsichord turns out to be the loser. Nonetheless, Michael Thomas has made plans for a similar festival to be held in England some time next year.

Wallace Zuckermann

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PORTRAIT of a BUILDER



JOSEPH NORRIS, Philadelphia, Pennsylvania

As a child, I spent part of a summer visiting with my uncle, pianist Girrard Gearhart, in a residential section of Philadelphia. After all those years, I had now returned to Philadelphia. This time to find Joseph Norris, harpsichord maker, who is doing much to aid the careers of many musicians throughout the country by supplying them with excellent harpsichords.

The trip by cab to 9 North Preston Street was through a wide variety of twisting streets. I had been told to direct the cab to a certain inter-

section where I would find a parking lot. From there I was to look about until I found a green door. That would mean I was near the shop. I found the green door and, nearby, the door and stairway to Joseph Norris Harpsichords.

The shop is located in the garden level area of a large industrial type building. There is plenty of space and light and one side of the shop boasts large doors and a ramp up to the street . . . ideal for bringing in raw materials and taking out completed instruments.

A collection of instruments in various stages of completion occupied about one fourth of the floor area. Several employees stopped long enough to say hello and exchange a few pleasantries before going back to work. After a tour of the shop, Joseph directed me into an adjoining office which contained a completed harpsichord, comfortable furniture and a coffee table which held a stock of back issues of "The Harpsichord".

I started the interview by asking Joseph to tell us how his interest in the harpsichord and harpsichord building evolved.

JOSEPH NORRIS: The background of my interest in harpsichord is not very interesting. I studied piano at one time and was naturally interested in other keyboard instruments. I had heard harpsichords before but actually didn't get the fever. That was until I saw and heard a Challis harpsichord.

After that I wanted any kind of a harpsichord at all. At that time I was an electronic engineer working on audio recording and computers. I built the air-born computer which controls the guidance of supersonic planes. Before that I was a symphonic conductor, so I have had quite a change of occupations over the years.

HANEY: When you were conducting, did the harpsichord play any roll in your work?

JOSEPH NORRIS: The only thing I ever did where we used a harpsichord was a Brandenburg concerto and I had a long argument with myself whether to use harpsichord continuo or not. This was back in 1952. We used one, but I don't recall what type instrument it was.

I studied composition and conducting with Dimitri Mitropoulos and Igor Stravinsky but I discovered that I just didn't have the stamina for that type of work. After about six years I was worn down to a nervous wreck and decided that life was too short for that sort of thing. It was then that

I went to audio engineering and computer design. But I have decided that I never want to get into that business again!

After much frustration and even more governmental bungling I decided there was more to life than designing and building expensive electronic military equipment which in some cases was never used. It was then my wife and I decided to join the Peace Corps but they didn't take us.

Instead, we went to Virginia as teachers where the two of us, for two years together, earned only three thousand dollars. We were snowed in in the winter. They dropped our food by helicopter, and only 40 miles from Washington! We couldn't get out and I needed something to do on some of those long winter nights. So I decided to build a harpsichord.

I knew nothing about it. I hadn't even seen a Zuckermann kit at that time. But I went ahead and built the first one and it was sold before it was finished. I had been building it for our own use and had not planned to sell it, but some friends just *had* to have it, so it went.

Well, that harpsichord was gone so I started on another and perhaps this time I could make it a little better. So I made the second one and that one was sold before it was finished.

Well, that same thing happened two more times and I finally started to catch on that this was something I could do. I had never had so much fun in my life.

For the first time in twelve years I was facing each new day with enthusiasm. I was waking up in the morning with a smile on my face and anxious to get to work.

So we decided to take a chance. I took all the savings I had and decided to go into business. I visited Hubbards shop, although I didn't meet him at that time. I built about 13 Zuckermann kits trying to improve each one as I went along and finally I undertook to build some of my own.

I copied scalings from Hubbard's book and studied antique instruments

and built instruments based on that knowledge. All these instruments were sold so we had enough money coming in to at least buy shop equipment.

By this time I had some idea creeping over me that I had something to contribute. I had a certain feeling that my work was important for the first time in my life. So we decided to play it for all it was worth.

We moved from my mother's basement to a much larger shop where I have 2,500 square feet of space. We are not breaking even quite yet, but we have great faith in the future.

HANEY: *How do people learn of your instruments?*

JOSEPH NORRIS: Mostly through word of mouth. We have never done any advertising. We make about six

instruments a year and have about 30 instruments of my own, that is not counting kit instruments, which are now in service.

Reviewing our sales records as of August 1971, I find that we sell about half to colleges and half to private individuals. Single manuals outsell doubles two to one. The average price for one of our instruments is \$3,500 for a single manual. The price range is from \$2,800 to \$6,000. We are making "exact" copies of several old instruments but these are very expensive, one running as high as \$8,000. We go to the harpsichord, photograph it, measure it, copy the hinges, the paintings, everything.

HANEY: *Earlier in the day you mentioned that you were now producing*



This instrument is typical of the harpsichords regularly produced by Joseph Norris. This model combines the stability of metal soundboard, bridges and pin block with all the warmth and beauty of an antique instrument.

the instruments that you want to build, that your results are more closely related to your ideals. How do you know what you want? What process do you go through?

JOSEPH NORRIS: I don't think that that is too difficult to answer. At least now while we are still young and ignorant. Twenty years from now we will probably be puzzled. We are looking for an instrument we can use for producing music from any period. We want it to have the ability to sustain for a reasonable length of time, to allow articulation and definition so we can play French trills and things of that ilk. Also we want an instrument to produce a sound we don't get tired listening to. It should have the quality of endurance. Of course the quality of the tone guides us more than anything else.

For wearing quality we've always preferred Italian instruments. There is something about a dry, crisp sound that doesn't tire the ear as opposed to a slightly more mushy, may I say, French tone or the completely mushy English tone which is thick and guttural. The Italian instruments have sort of been our guide. The only major departure with me has been in stringing rather than scaling. We use much heavier strings, and make them tight.

HANEY: *Is this stringing your own creation?*

JOSEPH NORRIS: No, not actually.

We have our own stringing chart but John Challis has been our mentor. This is something he does also.

I think this is the natural direction to go because Italian stringing was always very loose. The Ruckers school got tighter and the English school was the tightest. As a consequence the cases kept getting heavier and heavier. Now we don't have that problem using, as we do, an aluminum frame which can easily stand high tension on four sets of strings. And we don't lose resonance either. An aluminum frame resonates just as much as a wooden case. Also, outside the Italian instruments, I very seriously doubt that case resonance has anything to do with the sound anyway.

We tend to feel here that the string sounds best just before it breaks. This leads to one contradiction. When we plan the scaling for a keyboard we like to arrange our treble section so that it has as few harmonics as possible. We like it to be as clear a sound as possible up there where things are harmonically rather close together. Whereas in the bass, we try to get as many harmonics as possible to get as rich and full a tone as we can. One needs articulation in the treble and middle range much more than in the bass. That's the way music is written. Because of this our treble strings tend to be tighter than the bass

strings. But this is not all.

We also pluck the string rather far from the nut so that we are not getting much more than a primary fourth harmonic. We measure these on an oscilloscope and we know exactly what our harmonic content is and we can also correlate our opinion of the sound with the harmonic pattern of the scope. In other words, we really do know what we are talking about. Also, we can repeat our findings, which is comforting.

HANEY: *Do you ever record the harmonics of an instrument you feel is exceptionally fine, then try to duplicate those exact harmonics in another instrument?*

JOSEPH NORRIS: Well there is something esthetically oriented in me which keeps me from doing too much of this. I can certainly do it since I have a very complete electronic shop, including a wave analyzer. When I get a good harpsichord, one that begins to sound like its getting to where we want it to go we will make graphs of some of the strings to see what they look like and maybe approximate what our ideal would be from that. This is how we have known what to do with the aluminum instrument. It's strung very differently from our old instruments.

We found, by accident, that one of our C's was tuned to a D pitch and found that it sounded much bet-



Joseph Norris works at one of the miniature precision drill presses in his well equipped shop.



An assistant works on the outer case while Norris tests the keyboard action.

ter than the D string of another instrument sitting right next to it. On that basis we changed our scaling. Of course that is pure serendipity, which we hope we have a lot more of.

HANEY: *What do you find to be the most difficult problem in making harpsichords?*

JOSEPH NORRIS: Well (laughter) the hardest thing is having the patience to wait to see how the instrument is going to sound. I really don't know what is most difficult. Harpsichord building is the only thing I have ever done where there are no mistakes allowable anywhere. If I somehow put a little nick on a key when I am making it, it practically destroys the instrument for me. As long as everything goes well, it inspires me to work more carefully on the next

step. The most difficult thing is the constant pressure of working without mistakes.

HANEY: *Do you use Delrin in your instruments?*

JOSEPH NORRIS: We use Delrin for making jack bodies and occasionally use Delrin as plectra.

HANEY: *What do you use when you don't use Delrin?*

JOSEPH NORRIS: Leather.

HANEY: *John Challis believes that Delrin is too stiff to use for plectra. What is your comment on that?*

JOSEPH NORRIS: Well, it may be too stiff when it arrives in our shop, but it's not too stiff when it leaves here. Delrin on an aluminum instrument as opposed to a wooden instrument has a very different effect. Aluminum has a different sound, especially

when a metal soundboard is used, and we now use metal soundboards. Moreover, the people I know who are making aluminum harpsichords with aluminum soundboards are also using a very different scaling from those using wood. We have a compounded problem here.

I have used my aluminum scaling on a wooden instrument and from a distance of 30 feet have been unable to tell the difference between the two. I am less and less convinced that the aluminum is really coloring the sound as much as other people think it is. It's double consonance that makes it. I would never hesitate to use Delrin on a close plucking rank. It must be pared down very dense so it doesn't over pluck but it gives a delightfully crisp and nasal register. When used with aluminum I think Delrin somewhat underplucks in its own peculiar way it doesn't set the aluminum soundboard into sufficient motion to give it clarity. Somehow the sound gets eaten up by the bridge before it gets to the body of the soundboard so that's why I use leather.

HANEY: *Do you know that the aluminum soundboard reacts, vibration wise, differently from wooden soundboards?*

JOSEPH NORRIS: It certainly does act differently. In the cross section of a good spruce soundboard it first of all has three or four glue joints running down through it which are stronger than the wood itself so has various densities of fiber running perpendicular to the keyboard. Now the sound is going to be transmitted differently through these thicknesses and thinnesses of material across the board until it finally reaches the sides of the case. With aluminum it is not so. Here we have a clean piston driving air with as few encumbrances as possible. I tend to get a less infringed-with sound pattern across it.

HANEY: *Have these differences been measured scientifically?*

JOSEPH NORRIS: I have never made corresponding measurements between the same stringing on a wooden instrument and on an aluminum



This photograph clearly reveals the precision of work and cleanliness of design which is typical of a Joseph Norris instrument. Notice the metal bridges which are made from a solid block of imported aluminum. The metal bar is drilled out by hand to produce a structurally sound, but lightweight bridge. The tuning pins sit in bushings which are solidly imbedded into the metal pinblock creating an almost maintenance free instrument.

one. But you can sure feel it with your fingers if you run them across a wooden soundboard which is being set in motion.

You will find that places remote from the bridge will have even more vibrations than when you are close to the bridge which are not necessarily nodal behavior. It tends to be over the more dense part of the soundboard.

HANEY: *Wooden soundboards vary in thickness from the center to the outer limits of the soundboard. Is this also true with metal soundboards?*

JOSEPH NORRIS: Some of this I would have to say is still classified information. John Challis has worked years perfecting the metal soundboard and his discoveries still belong to him. He has been most kind in passing on to me the results of much of his work, but the details of the workings of the metal soundboard would have to come from him. But I would say, that there are steps taken to assure a particular kind of vibration. We simply don't throw in a piece of metal and clamp it down.

By the way, part of this difference between wood and metal we have managed to eliminate. There is a picture in Russell's book of an early eighteenth century harpsichord by Thomas Hitchcock which has the soundboard grain running diagonally. This does three marvelous things.

When it splits, it's not a catastrophic split because the split is reinforced by both the bridge and the cutoff bar. More than that, the bridge is driving the wood directly across the grain rather than at that particular angle to it and the instruments are almost twice as loud.

HANEY: *Are you still making harpsichords with wooden soundboards?*

JOSEPH NORRIS: Yes. We make them if they are ordered. We are not so wealthy that we can afford to not make them.

HANEY: *When one comes to you to order a harpsichord, do you encourage them to purchase a metal soundboard?*

JOSEPH NORRIS: If they come knowing definitely what a good harp-

sichord is and they want us to make that good harpsichord, then there is no argument and I am willing to make it. I am not willing to make all types of instruments. I will build no more English type harpsichords and probably no more French types either.

HANEY: *What are your major reasons for not wanting to build English or French instruments?*

JOSEPH NORRIS: I don't like the English sound for one thing. It doesn't please me to hear my own work and we do have to get some esthetic pleasure since we are not getting much monetary reward. My interest is in finding and perfecting new things. There are many fine builders who enjoy copying old instruments and do it well. I feel that I want to make a different kind of contribution. We are looking for an instrument which is not going to be burned in a future revolution for fire wood. The harpsichord did die once, after all, and for suspiciously good reasons. We'd like to build harpsichords that are not going to fall prey to the same kind of fault.

HANEY: *Would you build a harpsichord entirely of metal?*

JOSEPH NORRIS: No. First of all it wouldn't look very well. It wouldn't please me. I like the outer wooden case. Secondly the tooling costs would be phenomenal. I have been asked to make one with a plastic case but that just turned me off esthetically. I don't want to be ultra modern. That is not the point. The point is to make a good instrument. If it could be made of wood, that would be fine. It's much cheaper to buy wood working equipment and work in lumber than to work in metal. The mistakes are not so costly and the equipment is not so dangerous. But we must use metal if we are going to make a fine, stable instrument.

The pinblock must be of metal. This is so obvious to me so it doesn't bend or twist. The pinblock is responsible for most of the tuning accidents in an instrument so it has to be metal. All our wooden instruments have metal supports under the registers but against wooden frame members on the

inside but these can be made very rigid.

HANEY: *Do you think in the future, harpsichord design will become standardized as the piano is now and all builders will produce instruments which sound the same?*

JOSEPH NORRIS: I think it will have to happen if the harpsichord is to last. The modern symphony orchestra could not exist with baroque instruments. Nobody today would go out and buy a Mozart type piano for concert hall use to play Rachmaninoff or most other 20th century composers. There are copies being made which of course are intended to be used for that early period of music.

I think that if the harpsichord stays as an 18th century device then it has to be part of a fad for 18th century music and when that fad dies out, the harpsichord will die out again and a lot of us will be out of business. I think that the harpsichord sound has enough to contribute both to composers and listeners that it is worth reviving for other reasons aside from the appreciation of early music. I think it a worthy contemporary instrument in the sense that the modern French horn is and the modern piano is. If this means aluminum soundboards, then perhaps they will all have aluminum soundboards but I think there is a lot more experimentation to be done yet before we come to a standard instrument.

HANEY: *Since wood is becoming scarce do you think other builders will convert to metal?*

JOSEPH NORRIS: If they do convert I believe it will be because metal works better in that particular spot not because wood is scarce. And wood is hard to find in this country. We have problems getting good quality. I don't stock all kinds of wood. If someone wants an instrument of cherry I will make it, but will order the stock special. Mahogany is very difficult to work with. The dust is annoying and it never finishes quite as nicely as I believe it should. Walnut finishes so beautifully and is such a standard, acceptable single kind of wood that

(Continued on page 18)





HARPSICHORD *of*



NOTE

By Nanette G. Lund



T

he Hass family of harpsichord builders worked in Hamburg producing quality instruments. Many of these are found today in Scandinavian museums indicating a lively trade in harpsichords and clavichords from Hamburg to the

Scandinavian countries.

Examples of Hass' workmanship surviving today in Scandinavia are a two-manual harpsichord of 1721, now with only one manual and a hammer (piano) action installed, and a two-manual instrument dated 1723 with four registers, 8', 8', 8', and 4' housed in Copenhagen's Musikhistorisk Museum. Hass clavichords are to be found in the Copenhagen collection and the Folk Museum in Oslo.

A beautifully decorated one-manual harpsichord in the Kunstindustri Museet in Oslo, Norway, is inscribed, "Hieronymus Albrecht Hass fecit. Hamburg. Anno 1732." This instrument belonged to the Lorange family of Spørck-garden in Frederikshald, Denmark, before being acquired by the museum in 1895. It has not been restored except for an unsuccessful attempt to make it playable by the addition of new tuning pins in 1905. Both the soundboard and pin block are badly cracked, and the quill plectra have naturally disappeared. The keyboard and jacks are in surprisingly good condition and function rather smoothly. The instrument has not been restored because the museum feels that to do so would damage its historical value.

The inscription, "Hieronymus Albrecht Hass fecit. Hamburg Anno 1732" is plainly visible on the soundboard just behind the three registers of jacks. Raymond Russell has stated that no inscription was visible on this instrument.

The range of the harpsichord is C - d³. Three handstops for the three registers plus one for the buff stop are found inside the instrument behind the nameboard. (See plan view photograph).

The registers are arranged as follows:

8' (Buff)	(front)
8'	(middle)
4'	(back)

The string scaling for the front 8' is as follows:

C	65.95 in.
c	46.26 in.
c ¹	26.18 in.
c ²	13.58 in.

c³ 6.89 in.

The dimensions of the case are as follows:

Length 7.19 ft.

Width 32.67 in.

Depth 9.64 in.

Length of Cheek 25.19 in.

Tail Angle 60°

Double Curved Bentside.

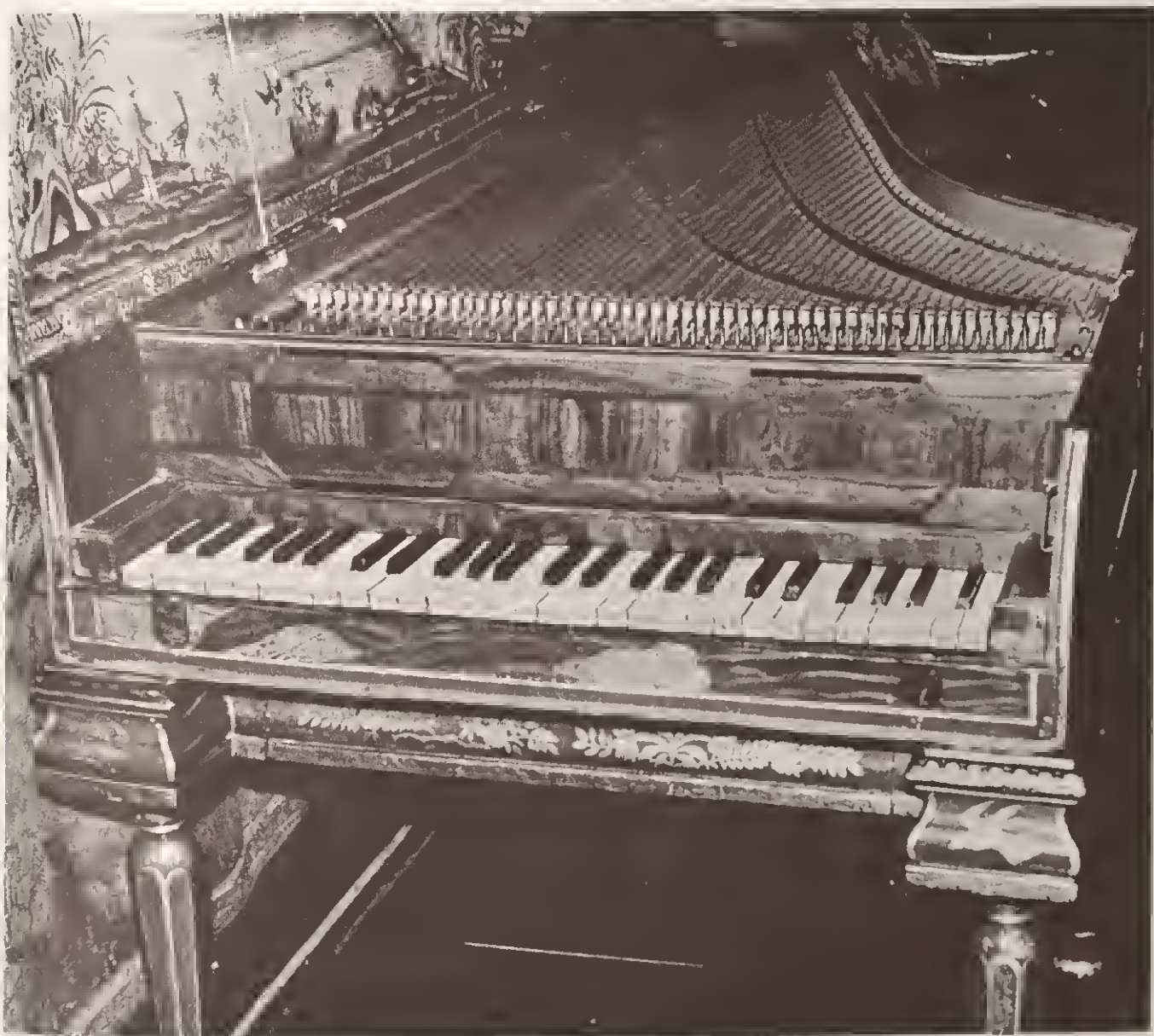
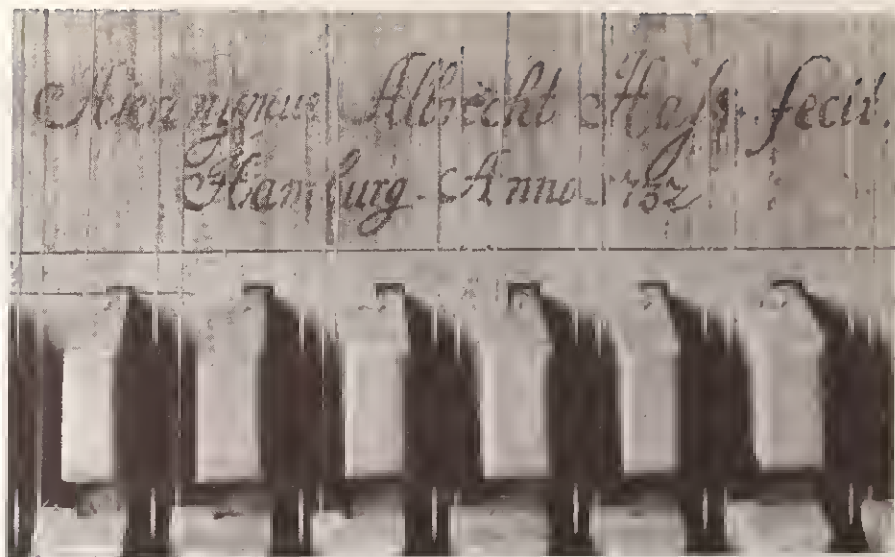
The case of the harpsichord is



highly decorated with colorful Chinese lacquer paintings, a very popular style during the eighteenth century. Many keyboard instruments, especially those built by Hass, were lacquered in this manner.

The outer case and stand are a rust red color with several other colors and gold leaf used for the designs and accents. The inside of the lid has a pale green background with red and darker green predominating in a multi-colored design. The soundboard is elaborately painted.

Nanette G. Lunde
Instructor Harpsichord/Piano
Wisconsin State University



This closeup photograph of the keyboard illustrates the excellent condition of the instrument. The keyboard surround features a rather curious octagonal design inlaid in wood.

is ELECTRONIC TUNING

the answer?



by Hal Haney

Hundreds, and perhaps thousands, of harpsichords, clavichords, and virginals sit silently in a corner because their owners cannot tune them. Unfortunately, learning to tune can be difficult, especially in this day and age where time is so compressed and only brief moments can be devoted to each task.

Dr. George Sargent has covered the art of tuning beautifully in a series of five articles, "The Well Tuned Harpsichord." But these tunings require the tuner to hear and count beats. Don Gault taught us how to compare beats with a metronome for mean tone tuning (Vol. III, No. 1). But what does one do if the instructions of both Dr. Sargent and Mr. Gault still leave us floundering around with an instrument which seems to get constantly worse until it is an embarrassment to us and our knowledge of the instrument?

First of all, you may purchase a complete set of tuning forks. Tune one octave using the forks, then match all other octaves to the tuned octave.

Simple? Not to everyone.

You must still recognize beats and establish them in your mind rather rapidly since the tuning fork sound is rather soft and decays almost as fast as a harpsichord string. Also, for the beginner, it takes three hands. One to hold the fork against the soundboard (which increases the volume), one to hold the key down, and the third to adjust the tuning pin.

A pitch pipe is also available, but I find it useless. They are never accurately tuned, and the pitch is raised or lowered somewhat by the amount of air which is blown against the reed. As the breath heats the metal reed, the pitch changes even more. A pitch pipe will put you in the ball park if you have no idea where "A" is, but its value to the harpsichordists is limited from there on.

Now we turn to "electronic" tuning devices which are designed to do most of the work for you.

You'll notice I said "most" of the work. Nothing now on the market will do all the work for you. One of our

I.H.S. members is working on a complex tuning device which is built into the harpsichord and which constantly measures the string vibrations. When a string starts to deviate from its absolute pitch, an electronic brain takes over, analyzes the problem, and instantly makes the precise adjustment necessary to restore the string to its correct pitch. The instrument is constantly being tuned while it is being played. If it stands idle for a long time, a simple chromatic run down the keyboard instantly brings the instrument up to perfect pitch and keeps it there as long as the harpsichord is played. The first of these instruments has yet to be built, so there is no need to dwell upon it here. No instrument on the market will tune for you, but some instruments will make it very easy to tune accurately.

When I first started to investigate tuning aids, I thought it would be wise to write a series of articles which would cover, in detail, the good and the bad points to be found in each one. After contacting every company



I could find which was manufacturing "tuners" and several who were still in the planning stage, it became obvious that two companies produced a wide range of products which could handle the tuning needs of almost everyone and were immediately available. To save time and valuable space, I have decided to use two of the best as examples here: C. G. Conn and Peterson Electro-Musical Products. As other superior developments appear, they will be reported in future issues of *The Harpsichord*.

The observations reported here are, for the most part, my own and are based on my own experiences and needs. All tuners examined did the job they claimed to do; but, in all honesty, I must admit that I thought the Peterson Tuners did that job with great accuracy and ease, and the physical layout of the tuners was generally superior to others.

But back a moment to the tuning fork.

When trumpeter John Shore (for whom parts were written by Handel

and Purcell) invented the tuning fork in 1711, it produced the purest tone known. In other words, the upper partials were few and faint. Its only drawback was the difficulty in keeping a continuous sound going. Much later, an electro-mechanical device was invented which both kept the fork vibrating and amplified it somewhat, but the tone was still not totally pure and a nick in the fork would cause its pitch to be permanently changed. Then World War II catapulted us into the electronic age.

From this time on we started measuring sounds electronically as well as producing them electronically. It is true that electronic sounds were being produced long before World War II, but the transistor makes a pure, stabilized sound production much easier to produce. Now any single tone (even those beyond the range of human hearing) can be produced with amazing precision, unencumbered (or enhanced) by overtones. The volume of this pure tone can be easily increased or decreased and the touch of

a dial can switch the tone to another position on the scale. In other words, our modern tuning fork has reached a high state of refinement. It has accuracy; it has volume; and it has permanence.

Two excellent tone generator type tuners are available from Peterson. The smallest and least expensive is their Model 70. This is the instrument which is recommended by Richard Jones of Jones-Clayton harpsichords in Los Angeles to everyone who purchases one of their harpsichords. It is battery operated and simple to use. It produces one full chromatic scale. Just tune the middle octave to match the tuner, then tune the other octaves on either side to match the middle octave and your instrument is tuned.

In using this type of tuner it is necessary to hear beats, but it is not necessary to count them. When all the beats disappear, that string is in tune and you can go on to the next.

If you want a much more sophisticated tuner, the Peterson Model

300 is available. This operates on house current and works basically the same way as the smaller model, but with two important exceptions. The range is expanded to seven octaves of pure tone, and each of those tones can be raised or lowered one-half semitone in steps of 1/100th of a semitone. The entire range is from C-65.406Hz through B-7902.128Hz. This instrument is often used for tuning pianos and organs and an output jack permits an extension speaker to be carried into pipe chambers. The 27 transistors and 3 diodes boost the price of this "tuner" to well over twice the price of the smaller model.

If you can neither count beats nor hear them, there is still hope with the Strobe Tuner.

This is the ultimate in tuning aids. One need know absolutely nothing about tuning to do quite a job. Some harpsichordists wouldn't think of using a strobe, and others swear by it. Briefly, the strobe works in this way.

A microphone is placed on or near the soundboard which picks up the sound of the string. This is converted to electrical impulses which rapidly flash a small light behind a translucent rotating disk. The disk contains a series of dark lines or divisions. When the lines appear to stand still, the string is in tune. It's that simple. All one needs to do is watch the rotating disk. It is not necessary to listen for anything. Now then, if it's so simple, why doesn't everyone use it?

First of all, it is inclined to be expensive. Secondly, it takes a bit of experience to get perfect results. Thirdly, some harpsichordists believe that it tunes too perfectly — that the strobe-tuned instrument is too cold and mechanical.

Harpsichordist Igor Kipnis has used a strobe tuner for years. When I asked him the advantages of strobe tuning, he replied:

"For me, its most important use comes just before a concert when I am on tour. The noise level in an auditorium the afternoon of a concert can be maddening. Chairs are being set up; students are shouting across

the hall; tables are being dragged about; and yet this is the only time one has to tune! Under these conditions, working with the ear alone is very difficult. The strobe tuner makes the tuning process much easier."

Then I asked Igor about the complaint that some artists believe that a strobe-tuned instrument was cold and without feeling. He replied:

"As you play through the evening, you find that there is a change in the tuning. So consequently, let's start as perfectly as we can. Cold if it must be, but then let it shift.

"I have been to too many harpsichord recitals where the harpsichord has been tuned by the harpsichordists themselves, not even harpsichord tuners, where the instrument at the beginning does have this warmth. It sounds very round and attractive at the beginning. But by the time the second half of the program starts, the instrument is wildly out of tune. I don't know what is wrong with the harpsichordist's ears, but that is how it seems to me.

"I find that the strobotuner does not save time *per se*. But it does save on nerves. If you were to start tuning and something went wrong with your tempering at the beginning, then, of course, it would save time because it does the whole thing automatically. The beauty of the instrument is that you can do one octave which it will temper for you according to this fairly clinical system, then you can do the rest of the instrument by ear. Of course, if you wish, you can do the entire instrument electrically. I have found that it is possible to make a mistake on some of the notes which are in the extreme ranges. These instruments read overtones, and it would be easy to tune on an overtone, in which case you are off, but it will read correctly. You do have to be approximately within the right area, the right pitch. In the very high strings, just a slight twist of the tuning hammer, and you are way off, so these must be done with great patience and care. Tuning is not easy even under the best of circumstances."

I next asked harpsichord builder

John Challis what he thought of the strobe method of tuning. He replied:

"It has its faults. I learned tuning when I was studying organ at 13 or 14. Since the organ was not always in tune, I learned how to keep it in tune. Those were my first tuning lessons. These were to be helpful to me for many years to come. Of course, it's not very difficult to tune an organ. It has a nice steady beat.

"I never tune with a strobe. However, I had an interesting experience which taught me something about strobe tuning.

"Some time ago I visited a town where several of my instruments were in use. As a matter of course, I checked the instruments and found that each one was just slightly off from being perfectly in tune. Not much, just the slightest bit. But the strange thing was that they all seemed to be off to the same degree. I later learned that all these harpsichords had been tuned recently by the same man who used a strobe tuner.

"The difficulty lies in knowing when to accept the information given to you by the strobe. Just before the string is plucked, it is stretched; and at the exact moment of the pluck, the pitch is slightly sharp. A fraction of a second later, the pitch has changed again, and the strobe tuner records all of this activity, sending out all manners of confusing signals. At what second does one pick the right signal, or do you wait until the note is decaying? This situation must be faced with the strobe tuner."

Some months ago, I performed an experiment with a strobe tuner which may be of some interest.

Steve Jared, who is a talented harpsichordist and instrument builder, was scheduled to play my 2-manual, Douglas Barclay-built Hubbard-designed harpsichord in a recital at my home. I tuned the entire instrument using the strobe, and then checked it over an hour later, again using the strobe on every string. When Steve sat down for a brief warmup before the audience arrived, he turned to me and exclaimed: "What did you do to this instrument? It's beautiful!" Steve

has always tuned his own instruments and has a good ear. Now, this is not a procedure I would recommend doing very often because of the very long time required, but it does indicate what can be done and that the results are acceptable.

Both the Conn and Peterson Strobe Tuners are excellent, but both have some minor faults.

The Conn Tuner requires a warmup period of about ten minutes in order to stabilize both the mechanical and electrical parts of the instrument. Tubes are used instead of transistors. (New models may now be available with transistors, but we have not learned of these at press time.) If the instrument has been left on for an extended period of time (4 or 5 hours), some drifting may take place, and slight adjustments must be made, which are simple to do. The case of the Conn is of heavy pressed metal which is solid and protective. The cover is removable and can be used as a base for the microphone. This feature is not too important to harpsichordists since the microphone must be placed on or very near to the soundboard, and the cover/base is too bulky to do this conveniently.

The Conn *must* be calibrated before each use, but the fact that it *can* be calibrated is somewhat of an advantage. If you want to tune your entire instrument a third or a fifth low (or, more improbably, high), you may do so accurately. The Conn can be adjusted to agree with any other instrument which might be playing with you. This is especially helpful when doing harpsichord and organ compositions.

If you want a precise A-440 (and you do not have perfect pitch or a tuning fork), the Conn will find it for you. Just switch to "calibration" and the instrument automatically refers to the 60 cycle flow of electricity from your power company, and a true A-440 is presented. (Most power companies check their cycle production regularly. The Colorado power company monitors their cycle production every second, 24 hours a day. Should there be a deviation of as little as three one-hundredths of a cycle, it is

immediately corrected.)

The Conn strobe disk can be a little difficult to read, especially in the bass notes if you are using the strobe on every string. The microphone is a good one of heavy cast metal which will stay where you put it. My Conn arrived with three of the rubber feet torn off which exposed sharp metal bolts. It was a simple task to make new feet of liquid rubber. A tube chart is included with instructions to a radio repair man should replacement or adjustment be necessary.

The Peterson Strobe Tuner (Model 400) is a sexy machine. The case design is beautiful, efficient, and covered with black Moroccan grain leatherette. The cover can be detached or folded back to be used as a viewing stand. The line cord, microphone, and other small tools may be stored in the lid. Unfortunately, the line socket in the case is recessed so much that, once the plug is inserted, it is almost impossible to get it out without yanking on the cord. The microphone, while adequate for the job, is made of light moulded plastic which makes accurate placement difficult. The mike cord is stiff enough that, if there is a kink in the line, it will turn the microphone over.

The Peterson Tuner is a solid state instrument (no radio tubes) which needs no warm-up period. A Vernier Pitch Control is continuously variable, one-half semitone sharp or flat, and is calibrated in hundredths of a semitone. The Image Clarifier works well. I do not understand exactly what makes it work; but when you are tuning strings which are rich in harmonics, throwing a switch seems to sort everything out, particularly in the bass.

I doubt that my ears are any more sensitive than average, but I can hear a hum while operating the Peterson which is always a fifth above the note set on the instrument. This is so soft, it is not distracting, and some people do not hear it at all. The read-out dial or strobe disk is larger than the Conn and easier to read.

Conclusions:

(1) Electronic tuning aids are not

for everyone. If you know how to tune and are happy with the results, and if you never have to put up with outside noise while tuning, pass up these electronic miracles.

(2) If you can recognize beats but find it difficult to count them accurately, invest in one of the audible tuners.

(3) If you can't count or even hear beats (everyone hears them but might not recognize them) and still want a well-tuned instrument, then a strobe tuner is for you.

I have intentionally avoided mentioning prices for various instruments since prices change so rapidly these days. For more detailed information and current prices on the Conn Strobe, write to C. G. Conn, Ltd., 1101 East Beardsly, Elkhart, Indiana 46514. For information and prices on any or all of the Peterson instruments, write to William H. Hass, Peterson Electro-Musical Products, Worth, Illinois 60482.

The human ear, hand, and brain make up the finest tuning mechanism in the world. If you can get them to work together for you, you will never need a tuning aid. If you have difficulty, don't hesitate to call upon all the resources at hand to keep your harpsichord in tune. The type equipment used for tuning is up to you. ☺



GO FOR BAROQUE

(Continued from page 3)

which have remained hidden to the public for some time. The interview is profusely illustrated with original photographs which have never before been published.

Following up on Wallace Zuckermann's interesting study of key widths which appeared in our last issue, Hugh Boyle interviews Kerek Adlam on the importance of various finger techniques for use on instruments which have wide or narrow keys. It's an issue, we hope you will enjoy.

Hal Haney

JOSEPH NORRIS

(Continued from page 9)

I use it often. Good Walnut is very scarce now but I am told in 20 years there will be plenty of it since new trees have been planted and will mature in about that time. Almost all my lumber comes from New York or England. Beechwood, for instance, is impossible to get in this country.

HANEY: *Many amateur builders have written to us to request information about buying or building keyboards. This seems to be one of their biggest problems. Do you find keyboards difficult to make?*

JOSEPH NORRIS: No. They are not difficult to make. There is a set of procedures you can go through which makes a keyboard a snap to make. It just takes a little time and care. It's not hard at all. I make them the way they were made in the 18th century. One of my competitors here makes all the F keys he is going to need for three years, then all the G keys and all the A sharp keys. They are all milled to the right size and any key will fit any keyboard he makes. I enjoy the creativity of keyboards and we make the keyboards for the artist who is buying the instrument. In addition to that it would be hard to mass produce keyboards because not all instruments have the same range or same spacing. We tailor our keyspacing to suit the customer.

HANEY: *What do you think of the idea of setting up mass-produced harpsichords as we now have mass-produced pianos?*

JOSEPH NORRIS: To begin with, the pianos which are mass produced are not good pianos. I think of a dozen Steinway pianos I hear one is truly a fine instrument, and the others are simply pianos. I think if the name were taken off I don't think anyone would pay any special attention to the instrument anyway. Steinways are still very much hand made and they have excellent craftsmen who work on the prize instruments and then other people work on the regular instruments. With harpsichords, each instrument requires such personal attention that I don't believe it can be successfully

converted to assembly line production. Some builders have tried this and it just does not work. The instruments do not seem to have the unity they should have to be really a fine harpsichord.

Then too, the materials we work with insists on individual attention. Of all the boards cut in the world not two of them have ever been exactly alike and this is true of all wood. It has to be handled in different ways to come out with the same end result. Of course this is not as true with metal. With a metal pinblock, frame, soundboard and bridges we have a much greater degree of perfection in the quality of the materials so the results will tend to be more uniform. The results can be much more consistent. We can repeat things with much more precision in metal than is possible in wood. We don't get surprises. Occasionally we get woofs and whistles on the same pitch with different instruments.

HANEY: *What are woofs and whistles?*

JOSEPH NORRIS: Different makers call them by different names, but as you run along a scale a whistle is a note that suddenly sings out loud and clear regardless of how thinly you voice the plectrum. There are so many more harmonics than any note around it and it is very undesirable. We can get rid of them by lowering the pitch of that string by a quarter tone but right on pitch, there it is. Sometimes by moving a bridge pin or a nut pin you can get rid of it. Changing the dimension of the wire will also do it or we can move a pillar of our metal bridges and that often works.

HANEY: *What about the woof notes?*

JOSEPH NORRIS: We don't really know for sure what causes either one of them. John Challis has a definition for a woof and you will have to ask him about that.

HANEY: *The question arises from time to time about domed soundboards. Could you tell us your experience with this?*

JOSEPH NORRIS: My understanding of a domed soundboard is simply one which is put in with an arch in the

wood under the bridge which, if you ran your fingers over it, they would describe a convex arch. It's higher in the center than it is on either end. After the soundboard has been installed and the glue is dried, the arching props are removed which leaves an arch in the wood. As it dries out the dome will decrease in size, and as it takes up moisture it will increase in size. This allows free but controlled expansion of the soundboard. Now, should it become dry, so that the dome disappears, and then swells up again, you have no assurance that the soundboard won't dome downwards or concavely.

HANEY: *Are you aware of anyone making a soundboard which is severely domed, say like a violin?*

JOSEPH NORRIS: I haven't seen anything like that. It would pose some problems. For one thing, the bridge would have to be domed to fit the dome. Now, at what point does the tension between the bridge and the soundboard become so great that they separate? A bridge, due to constant drying and swelling will tend to loosen itself from the soundboard anyway. Of course this can never happen with metal. I think the dome is pretty much a gimmick. I don't think it is a serious consideration. Some small arc is advisable. On my wooden instruments I use a small arc. I have seen instruments where part of the soundboard was concave near the tail, and convex near the bridge, due to a combination of shrinking and swelling. Of course this could not happen with diagonal grain in a soundboard. The wood is swelling and shrinking perpendicular to the grain not along the grain.

HANEY: *I noticed that on one of your instruments, the metal bridge was made from a solid bar of metal which had then been routed and drilled out to make it hollow. Why was that done?*

JOSEPH NORRIS: Well, I couldn't find any angled or extruded aluminum which was exactly the right size for my needs, and which was of the quality I insist on using. Angled or extruded aluminum made in this country is almost always soft and gummy and very difficult to work. I use the

harder 60/61 type in bars and then drill it out. It requires much more work but makes a much better bridge. HANEY: *I have noticed three combinations of instruments in your shop; an all-wooden instrument, an aluminum frame instrument with a wooden soundboard and an aluminum frame instrument with an aluminum soundboard. Of these three, which do you personally prefer?*

JOSEPH NORRIS: The all aluminum. HANEY: *Why?*

JOSEPH NORRIS: It is easier to control the parameters. I don't have any surprises. I can predict much more accurately exactly what the sound is going to be like. I know that the instrument is going to be stable when it leaves . . . it's not going to come back to me in a couple of years with a cracked or warped soundboard.

HANEY: *Before you started building with metal, you had been exposed to instruments with wooden soundboards. Did it require an adjustment in your thinking before you switched over to metal soundboards?*

JOSEPH NORRIS: It didn't require any adjustment at all. The principles are all exactly the same.

HANEY: *Do you feel somewhat defensive about metal soundboards?*

JOSEPH NORRIS: Not one tiny bit! I have played enough harpsichords and lived with enough harpsichords to know that the metal soundboard is eminently satisfying and so much more capable of various expressions than wooden ones. I am very pleased with them.

HANEY: *John Challis once remarked that he would never want to deny new, young builders the pleasure he has had building harpsichords. What do you think about either kit builders or those who start from scratch?*

JOSEPH NORRIS: My shop is the home of at least four amateur kits every year. People are welcome to come here and work, within reason of course. In the last year, I have given about 600 hours of free time to schools and individuals who were building instruments, advising them and helping them voice. It's an industry of love for me. We are certainly not in it for

money. I had so much fun making my first instruments, in fact I still do.

HANEY: *Do you own a harpsichord?*

JOSEPH NORRIS: Well, some years ago my wife and I decided that each new harpsichord we finished would be ours so that if we were ever forced out of business, heaven forbid, the last one we are going to keep. They keep getting better over the years so our own instrument keeps getting better. I have one harpsichord, a blue Italian instrument in the shop, which I keep to play on but I probably will be losing that soon. I do intend to make myself one someday.

HANEY: *You mentioned working with schools. Have you ever loaned your instruments for recitals at schools?*

JOSEPH NORRIS: I tried it the first year and they brought them back in a pillow case! I don't any more. I built an instrument for BrynMawr College last year and it was played once, stored in a room at 85 degrees and zero humidity all winter long. It wasn't tuned, it wasn't cared for. When I finally rescued it it was completely out of shape. The pedals were broken and it was a mess so I brought it back and have just finished repairing it. The problem with colleges is that quite often there is no single person responsible for the instrument and its maintenance.

HANEY: *Do you have a philosophy which pertains to harpsichord building?*

JOSEPH NORRIS: The only wisdom that I find myself relying on again and again is the old business of not paying too much attention to tradition or the rabble rousers around me and trying to use a little common sense. I design harpsichords the way I would design anything else. I want them stable and to sound well. Even today I made a mistake in the shop because out of force of habit, I followed the precepts of one of my distinguished colleagues in the north in an operation which I know perfectly well should not be done in the way he says it must be done. Everytime I do it the way he says it should be done things just don't work out right. I've learned a lesson. After today I will follow my own style.

LETTERS

Dear Mr. Haney:

I suggest that assertions of a surprising character be documented in the issue in which they appear, rather than waiting for letters to catch up in a later issue.

Two examples come to mind.

Dr. Scroggs, near the end of his very interesting article in V. 4 No. 2, says ". . . this is the historically proper instrument upon which to perform the works of Scarlatti," Ralph Kirkpatrick, in his biography of Scarlatti, lists an inventory of keyboard instruments at the Spanish court, which includes several three-choired and even one four-choired instrument, presumably of Northern make, as well as Italian types. The internal evidence of the music seems to support the idea that different sonatas were played on different instruments.

Mr. Deakyne, in his letter in V. 4 No. 3, says "As everyone knows, leather predated the use of crow quill in plectra." As one of the benighted few who are unaware of this, I feel left out. Frank Hubbard, in *Three Centuries of Harpsichord Making*, pp. 17-18, cautiously suggests that Italian makers occasionally used leather (not predated quill) but then says "I have never seen a non-Italian harpsichord with leather plectra in which it was not perfectly obvious that the jacks had been replaced or reworked." He also says ". . . documents contemporary to the age of harpsichord building almost always mention quill as the only possible plectrum, and never include sole leather in the number of exotic substitutes which were tried from time to time in the effort to find a more durable material." As to the rest of Mr. Deakyne's letter, I am at a loss to know if he believes that wooden jacks make a Pleyel sound like an antique while a wooden instrument copied after an antique but using plastic would not. If so, he has never heard any antiques, I suspect.

Sincerely,
Rodney N. Myrvaagnes

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